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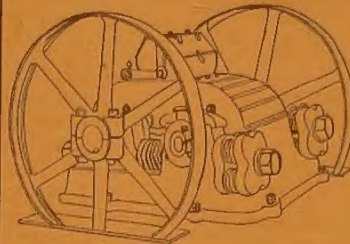
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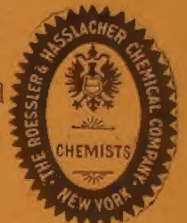
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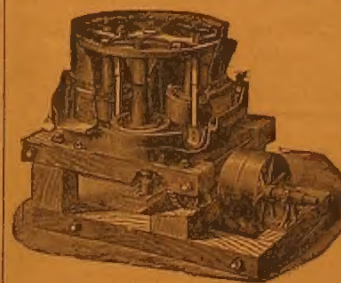
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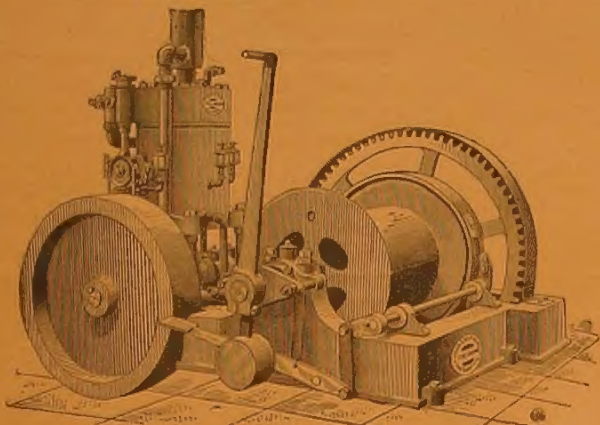
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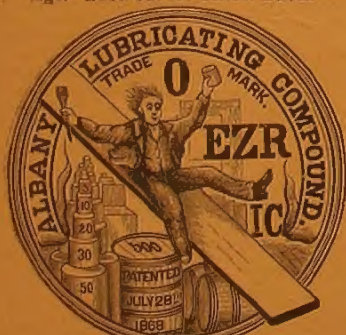
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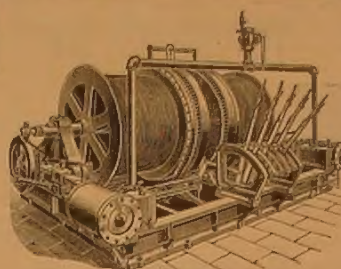
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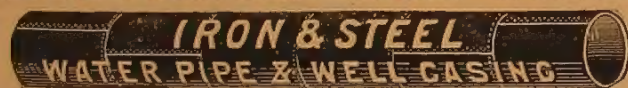
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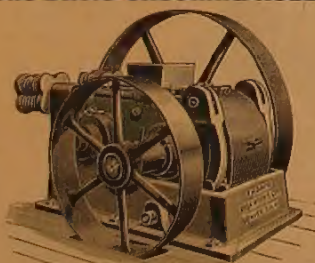
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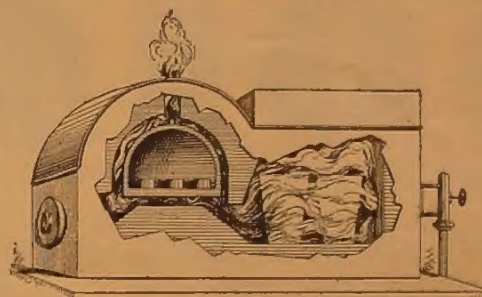
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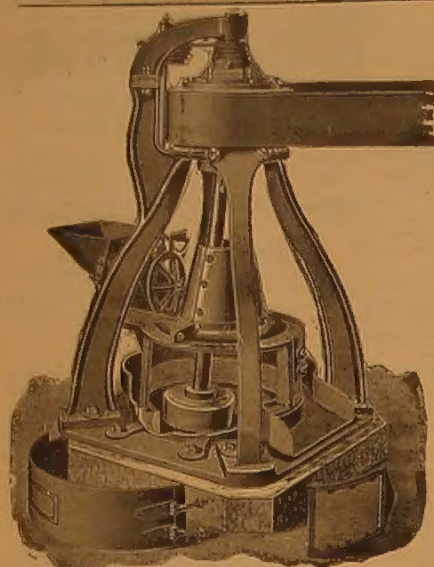
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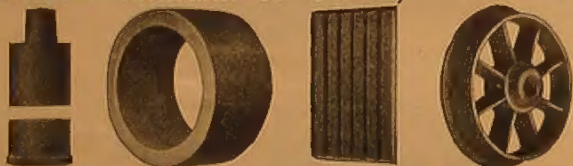
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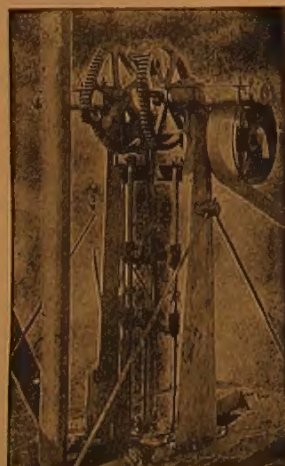
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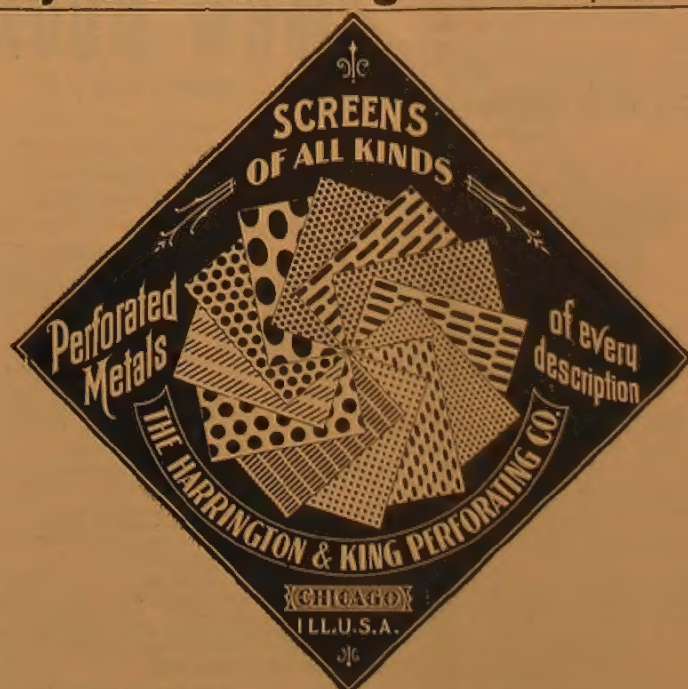
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ADVERTISING RATES FURNISHED ON APPLICATION.

The advances made in the mining industry during the last thirty years, in all branches, whether mechanical, as applied to machinery, or chemical, with reference to processes and smelting, have revolutionized the work of the mining engineer when engaged in the operation of a new property. When machinery is purchased at the present time, expert employees of the company furnishing the plant are entrusted with the work of putting it in place, and seeing that it operates to the satisfaction of the mine owner. In the same manner technical skill is employed in the installation of a new process which a change in the character of the ore may demand. The effect of this on the industry has been to make the operation of a mine a manufacturing business, dependent on the supply of raw material, which is ore, and lessen the risk of failure and the uncertainty of success. In no branch does technical skill play so prominent a part as where the aid of the comparatively new energy of electricity is employed. For these reasons it has been truly said that "we live in an age of specialists." The diversity of the industry is so great that the life-time of one individual is not long enough for him to gain the experience and become an expert in all its branches. The college graduate, fresh from school thinks he knows it all, until the ambition of youth forces him to make one or two mistakes, when technical skill proves to him that experience is a friend only acquired by long acquaintance.

Capital invested in mining is not alone benefited by expert knowledge, for the mine manager is thereby saved much responsibility and his duties made less onerous. Business competition has had its effect in bringing about this changed condition, together with the many improvements made in all branches of the industry, to such an extent as to furnish a class of skilled specialists in all lines.

A correspondent asks the question as to the best grade on which to move ore in and around a mine.

The transportation of ore is an important matter in the economy of working a mine, both underground and on the surface, which is too often neglected. The first condition to be remembered for making permanent mine tramroads is that the shortest distance between two points is a straight line, therefore avoid curves, if possible, even should it entail

more work in construction. For mine or tramcars on light rails from the mine stopes along the mine levels to the shaft, a grade of six inches in each one hundred feet, with the fall toward the shaft, will admit of the car being handled by one man when loaded, and when empty the grade is not too steep for him to push the empty car back. This grade will also carry off mine water where drainage is required. On the surface from shaft to mill, stock pile, ore pockets or dump, a similar grade is advisable, with the fall in the direction in which the ore or full cars are to be transported. If, however, the district has to contend with snow in winter, a grade of one foot in one hundred feet is also advisable under such conditions, as at that season a little snow on rails or wheels makes a greater fall necessary. If the line is much curved at such points an increase in grade to one foot in one hundred feet is also advisable.

In the event of there being no surveyor's level on hand, the mine foreman can find a good substitute in an ordinary carpenter's level and a board six inches wide and twelve and a half feet long, levelled or planed off on one side to one and a half inches for the grade of six inches in one hundred feet, and three inches for that of one foot in one hundred feet. Provided with these simple tools, the services of an engineer can be dispensed with. Good roads are said to be the standard by which to judge of the civilization of a country, but it may also be said that properly graded mine tramroads are the best indication for a stranger to judge of the capability of the mine management.

The large extent of mineral land which has been patented as agricultural land in the western States, has been alluded to by the JOURNAL on former occasions, and the subject has been taken up by other papers in several States. That this fraud on the prospectors and miners of the United States was ever allowed to be possible, resulted from the wrong policy of selling the land and not reserving the minerals for the use of the miner. The three branches of the public domain are divisible and distinct, and any dispute as to the ownership of one of them is unnecessary, under the enactment of wise laws for the benefit of all concerned. The timber belongs to the lumberman, who can acquire the right to cut so much per year, but it is not necessary for the public good to sell the agricultural or the mineral right with it at the timber value, as has been done. Nor is it wise public policy to sell the agricultural right to land and give the agriculturist the birthright of the miner along with the land, without consideration or reserve. The minerals ought to belong to the man who has the courage and knowledge to work them, and are the property of the people, which should not be allowed to pass into private control. We are but life-rented in them at the best, and State ownership of the minerals operated under liberal laws, will give us a life-lease, which is all we require. The holding of mineral lands for speculation, and waiting for labor and capital to come and buy them, at greatly increased value over the government land in the first place, is the worst form of monopoly with which the United States is cursed. It is the best means to stop industry and the increase of the national wealth, as it is a factor in the employment of labor, and the production of wealth and happiness which it is not in the power of man to create. So

long as there is territory to explore the prospector has a chance to live, but his best territory being that nearest civilization, roads and railways, has been stolen from him under false pretenses, or given away as of no future value. Such a condition of affairs is against the well-being of the country at large, and the people are calling for a change in our laws to put a stop to this evil, and to correct the errors of past administrations in not conserving the rights of the miner, in disposing of valuable minerals to agriculturists and others. By what principle in equity is the agriculturist made custodian of the property of the miner from whom he has to beg for terms to allow him to earn his living? It cannot be from higher intelligence on the part of the owner of the surface right who tills the soil.

The recent victory of the American Asiatic squadron, under Commodore Dewey, now Rear Admiral, over the fleet of Spain at Manila, on the 1st ultimo, which event gives to the United States a colonial possession of large extent and of value which cannot be at present estimated. To the commerce of the Pacific Coast they are of the highest importance, and of considerable interest to the mining and machinery manufacturing industries as a future field of operations.

The Philippine Archipelago has an area of 114,326 square miles, from latitude 5.24 to 19.38 N., and from longitude 117.21 to 126.8 E. It is bounded on the north and east by the Pacific ocean, by the Sooloo and Celebes seas on the south, and by the China sea on the west. The islands, which extend north and south from Formosa to Borneo and Moluccas, are more than 1,200 in number, but most of them are mere rocks of volcanic origin.

The principal islands are nine: Luzon, Mindanao, Samar, Panay, Mindoro, Leyte, Negros, Cebu, and Bohol. Luzon, with more than 40,000 square miles and nearly 5,000,000 inhabitants, is by far the most important of all the islands of the group. Panay, with 4,742 square miles, has a population of 1,000,000, and Mindanao, with 33,000 square miles, has scarcely 200,000 inhabitants. The total population of the islands has been variously estimated at from 8,000,000 to 10,000,000 natives, and about 8,000 Spanish, not including soldiers, with a few merchants, who are chiefly Germans, English and Americans. With the exception of Manila, the country is in about the same savage condition as it was 300 years ago, and travel outside the towns is dangerous to strangers, from brigands.

Of the mineral resources of these rich islands but little is known, as the Spanish officials and church authorities, who were the real government of the islands, did all in their power to prevent mining and keep the natives in ignorance and poverty, in case they got to know too much and became independent of the clerical rule. Oppressive taxation and official corruption and misrule have driven the natives into open rebellion on several occasions. A party now residing in Colorado states that the Philippine Islands may be found to be very rich in gold deposits. In 1875 he traveled from Manila to Singapore, with a man who had gone from Montana to the island of Luzon, for the purpose of investigating the reports of such wealth. He got the information in confidence, and as a return for kindness rendered to his companion. He told him that the result of his investigations were far ahead of anything he

had anticipated, and that the wealth of gold in that country was beyond estimation. He had gone to the Philippines with the intention of going into mining, if the situation was promising. He secured his information from Catholic priests located outside the town, and when he found it was worth investigation, he went to the Spanish governor to secure permission, but this official would permit nothing of the kind. He gave as the reason for his opposition that the development of the mines would tend to enrich and disturb the native population, while the Spanish policy was to keep them in ignorance and subjection. The rich tropical productions of the soil of the islands, and the mineral development of the hidden wealth, as yet undiscovered, with the necessary accompaniment of civilized government, education and honest dealing with the natives, will make these people happy, contented and prosperous under wise American rule.

The Electro-Chemical and Electro-Metallurgical Industries of Europe.

Electricity of a recent issue publishes the following very interesting article on Bullion Refining by John B. C. Kershaw, F. I. C., of London.

In the year 1851 Charles Watt obtained a patent (No. 13,755) which may certainly be regarded as the master patent of the electro-chemical industries for not only did it clearly set forth the conditions necessary for the production of chlorine, alkalis and chlorates from solutions of potassium or sodium chloride, but also the method and details of procedure to be adopted for refining by electrolysis alloys of copper, silver and gold. This patent was of course forty years before its time, and even had it been filed in 1891 instead of in 1851, it is questionable whether it could have been upheld in a court of law; but it is nevertheless of great interest as showing how early the idea of using electricity for the conduct of chemical and metallurgical operations upon an industrial scale was formed.

The principle of the method to be used in refining operations is clearly set forth in this patent of Watt's, and the electrolytic procedures used to-day for refining copper, silver and gold are simply developments of the ideas contained in this patent of 1851. Moebius, who is the patentee of the silver refining process in use in Europe and America at the present date has of course much improved upon the plant and apparatus suggested by Watt for effecting the separation of silver and gold and as the validity of patents in the electro-chemical and electro-metallurgical branches of applied science rests upon novelty in design of the plant and apparatus used, and not upon novelty of principle, the Moebius patents are doubtless valid.

Gold and silver refining by electrolytic methods is carried on at three works in Europe, two being in Germany and one in Belgium. At Frankfort, the Moebius process is used for refining silver on a fairly large scale. This process is also in use at St. Louis, at Perth Amboy, and at Pittsburg, in the United States, so its main features are no doubt known to many readers of *Electricity*.

The plant at Frankfort is designed for an output of 35,000 ozs. silver per day of 24 hours. A 25 H. P. gas engine drives a dynamo yielding 150 amperes at 100 volts. This current is passed through 60 to 70 cells in series, each requiring about 1½ volts. The vats are of pitch pine, and are coated internally with tar, and each vat is divided into seven compartments. In these are hung three

rows of anode plates and four rows of cathode plates; the former are plates of bullion .40 in. thick each weighing 3.3 lbs.; the latter are thin sheets of rolled silver. The anodes are enclosed in linen bags. The electrolyte consists of a copper nitrate solution containing one-eighth of silver and during the electrolysis it is kept slightly acid by addition of nitric acid. In order to prevent short-circuiting the crystals of silver are continuously removed from the sheet silver cathodes and are allowed to collect upon a canvas tray suspended beneath the electrodes. They are withdrawn, washed, dried and fused at intervals in order to obtain ingots of fine silver. The refinery at Frankfort, known as the Deutsche Gold u. Silber Scheide Anstalt, is in a flourishing condition, as at the last annual meeting of the company a dividend of 12½ per ct. on the ordinary share capital was declared. This company has also an interest in one of the Niagara electro-chemical companies.

The Nord-deutsche Affinerie at Hamburg was one of the earliest, and for many years one of the most successful electrolytic copper refineries in Europe. Copper refining is still carried on at this works, but other electro-metallurgical operations have been taken up. One of the most successful of these is the parting of gold from platinum, which is conducted at this refinery on a considerable scale. This separation is effected by using plates of the gold-platinum alloy as anodes in an electrolyte of gold chloride solution, with thin sheets of gold as cathodes. The platinum under these conditions remains as a dark gray mud upon the bottom of the electrolytic vat. The process and apparatus are patented by German patent No. 90,276 of 1896. Recently some further details of the procedure adopted at Hamburg have been published,* and it is stated that by using a high temperature an excess of hydrochloric acid and a current density of 90 amperes per square foot, no chloride gas escapes at the anode, but that all is utilized in bringing the gold of the anode into solution. The gold obtained is absolutely pure, and the process is stated to be superior in all points to the older methods of separation.

The third refining process, which may receive mention in this article, is one for parting silver from argentiferous lead, and is, according to Oettel, in operation in Belgium,† though he gives no details as to the locality or the extent of the operations.

When zinc is melted with argentiferous lead in order to remove the silver from the lead by the production of a zinc-silver alloy, considerable loss of zinc and silver occurs, owing to the oxidation of the former. In the Rossler-Edelmann process this is avoided by adding ½ per cent. aluminum to the melt; the aluminum combines with the oxygen present as oxides of the other metals, and the separation of the fused mass into two layers is more effectual, owing to the greater fluidity of the melt. The temperature of the mass before the addition of the aluminum should be 500° C. The alloy of zinc and silver obtained in this way can contain up to 20 per cent. of the latter metal. It is cast into anode plates of suitable form, and these are used in an electrolyte of dilute sulphuric acid containing zinc sulphate. The zinc of the anode is dissolved and redeposited at the cathode, while the silver and the small quantity of lead present remain as an insoluble sludge upon the bottom of the vat.

Bullion refining, and the parting of the

precious metals, such as platinum and gold, can never, from their very nature, become very extensive branches of the electro-chemical and electro-metallurgical industries; but the facts given above show that the use of electricity in this highly specialized branch of metallurgy has already attained considerable development, and the future is certain to be marked by a steady, if slow, growth of the industrial applications of electrolytic methods in parting and refining the precious metals—platinum, silver and gold.

New Mill.

There is on exhibition at the assay office of Lew. E. Aubury, 115 West First street, in Los Angeles, an improved roller quartz mill, a recent invention, but which has been in successful operation for sometime. The mill presents many new and marvelous features, and is the invention of a practical mill man.

Roller quartz mills, in order to compete with stamp mills, must be manufactured cheaper and do better work. So far, the roller mills have cost about the same price, and have not done as efficient work except on soft ores. A recent improvement in the *Common Sense Roller Mill* claims several new features, chief among them is that the cost of the mill is 30 per cent less than in the present stamp or roller mills.

The mill can be used as a roller or roller grinding mill at the option of the operator.

It can be cleaned up ready to start on fresh ore in 45 minutes, an important feature in custom mills.

It can be made so that no part exceeds 300 pounds in weight, and can be taken anywhere that a mule can pack.

It can be worked by horse power, the same as an arastra, using little water, and will do as much work as ten Mexican arastras.

Ore can be ground to 150 mesh, if needed. Some of the base ores can be worked by crushing fine and using electric plates for saving the gold, which otherwise would go off in slimes. This mill is especially adapted to this class of work.

The mill is built of better material than other roller mills, being composed of 12 per cent cast iron, 30 per cent wrought and angle iron, 58 per cent chrome and manganese steel.

By a mechanical arrangement, any desired crushing force can be exerted at no additional cost to the operator.

For prospectors' use, and where a cheap and practical mill is desired, this mill appears to fill all requirements.

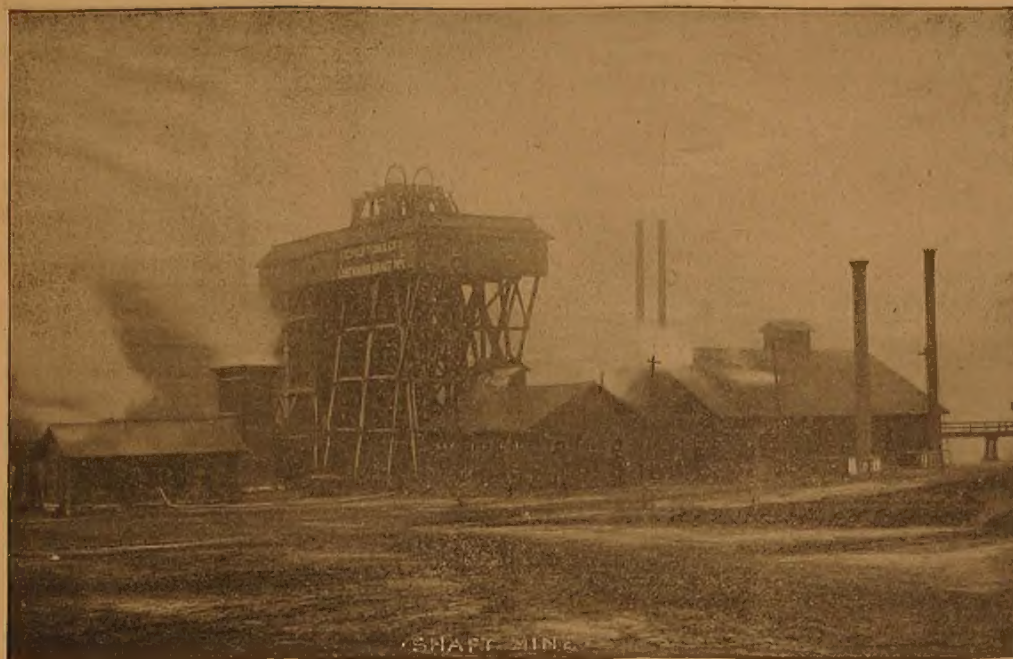
LEW. E. AUBURY.

The annual meeting of the stockholders of the Joseph Dixon Crucible Company was held at the company's main office, Jersey City, N. J., Monday, April 18, and out of a possible vote of 7345 shares, there were 7042 shares voted for the re-election of the old board, consisting of Edward F. C. Young, John A. Walker, Daniel T. Hoag, Richard Butler, William Butler, William Murray, Alexander T. McGill, and Joseph D. Bedle. President E. F. C. Young, Vice-President and Treasurer John A. Walker, and Secretary Geo. E. Long were re-elected by the directors. Judge Joseph D. Bedle was also re-elected as counsel.

We are in receipt of a catalogue from the Marvin Electric Drill Co. of Canastota, N. Y., describing the Marvin Electric drills and apparatus. Send for one; they are interesting.

*T. Ulke, in "The Mineral Industry" Annual for 1896.

† "Die Entwicklung der Elektro-chemische Industrie," 1897.



THE CONNELLSVILLE COKE REGION.

EARLY HISTORY OF COKING.

On account of the great importance of coke to the mining and smelting industry of the West, we deem it of interest to our readers to print the following description of the largest and most important coke region in the United States.

The date of the first manufacture of coke is enveloped in considerable doubt.

It is claimed it was used in this country in the manufacture of pig iron a few years prior to the Revolutionary War. This is scarcely possible, as it was not until the year 1735 that coke was used with success in England, and it did not come into general use as a blast furnace fuel until 1750. Authentic history gives Isaac Meason the credit of being the pioneer in the production of coke in the Connellsville region.

In 1816 and 1817, he built the first rolling mill erected west of the Allegheny mountains at Plumsock, Fayette county, Pennsylvania. The mill went into operation in September, 1817, and coke was used in the refinery. It is interesting to note that the coke used in this mill was made in Fayette county, which is today the greatest coke producing county in the United States. The next development of the use of coke was at a blast furnace in Bear Creek, Armstrong county, Pa.

In 1835, Franklin Institute, of Philadelphia, offered a gold medal "to the person who manufactured the greatest quantity of iron from the ore during the year, using no other fuel than bituminous coal or coke, the quantity to be not less than 20 tons."

A good gray forge iron was successfully made in 1837 near Uniontown, Pa.

The Legislature of Pennsylvania endeavored to encourage the mak-

ing of iron with coke and mineral coal, by the passage of an act in June, 1836, which gave the Governor authority to charter companies with ample power to prosecute this branch of industry. This, however, seemed to fail of its purpose, for in 1849 the records showed there was not a coke furnace in blast in Pennsylvania.

In 1856 there were 21 furnaces in Pennsylvania, and three in Maryland using coke, but none of them using Connellsville coke.

It remained for the Connellsville region to develop coke as a furnace and foundry fuel. The first coke made in ovens in the Connellsville region was in the year 1841. In that year Provance McCormick and James Campbell, two carpenters, overheard an English-

man commenting on the rich deposits of coal in Connellsville and its fitness for making coke, as well as the value of coke for foundry purposes, and they determined to enter into the business of manufacturing coke.

Associating with John Taylor, a stone mason, and the owner of a farm on the Youghiogheny river, including a coal mine which he operated in a small way, they commenced operations. Taylor constructed two ovens, and in the spring of 1842 enough coke had been made to fill two boats ninety feet long holding about 800 bushels. Campbell and McCormick built the boats and made the coke. They started down the river on a high stage of water to Cincinnati.

On reaching that city they found the demand for coke was not as brisk as they had hoped to find it. The new fuel was unknown there, the foundry men regarding it with suspicion, calling it "cinders." Campbell, who went with the boats, remained at the landing three weeks, retailing out one boat load in small quantities at eight cents a bushel. He traded the bal-

ance to a foundry man in Cincinnati for a patent iron gristmill. The mill was brought to Connellsville and when put in operation was found to be a failure. It was sold for \$30, and thus ended the first coking enterprise in the Connellsville region.

A part of the McCormick, Campbell and Taylor cargo was afterwards boated by canal to Dayton, O., and there sold to Judge Gebhart, a former resident of Fayette county, Pa., who at that time had a foundry in operation in Dayton. He used the coke in his establishment, and found it so well adapted for its purpose that he soon after went to Connellsville and proposed to Campbell and McCormick to make more, but the result of their previous venture in the coke trade satisfied





them. They declined to prosecute it further. In 1843 the ovens built by Taylor were rented to Mordecai, James and Sample Cochran, who used them in making 24-hour coke. When they had coked about 1,500 bushels, it was boated to Cincinnati and sold to Miles Greenwood, who, in the meantime, had become acquainted with the value of coke as a fuel. This is said to have been the first coke ever taken from Fayette county and sold for money and was the beginning of the coke business in the Connellsville region.

About 1850, three or four ovens were built and put in operation by Stewart Strickler, the produce being sold by him to the Cochrans, who boated it to Cincinnati and sold it. For some years but little coke was made, though a few ovens were built, and during these years the knowledge was acquired which was necessary for the coming developments of the trade.

RISE AND GROWTH OF THE REGION.

About the year 1851 the trade began to increase, and in 1855 it is stated there were 26 coke ovens above Pittsburg. It was not until the Pittsburg and Connellsville railroad, now the Pittsburg division of the B. & O., was completed to Pittsburg, and Connellsville coke had been successfully used in the Clinton Furnace at Pittsburg, that its value as a furnace fuel was demonstrated, and the foundation laid for the demand that has resulted in such an unprecedented development of coke manufacture.

The Clinton Furnace was blown in about 1859, to make pig iron from coke. The coke was made first from Pittsburg coal near the furnace on the south side of the Monongahela river. It was run about three months, when the coke proved unsatisfactory. The furnace was blown out and arrangements made to secure a supply of coke from the Connellsville region. The furnace was again put in blast in the spring of 1860, using coke made from the Fayette Coke Works, erected in the same year.

Forty ovens were built on Hickman Run in 1864 by Cochran & Keister, who transported their coke on a tramway to the Pittsburg &

Connellsville railroad until in 1871, when the Hickman Run branch railroad was built.

In 1860 the Connellsville Gas, Coal & Coke Co. was organized and built forty ovens near Connellsville.

In 1869, Watt, Taylor & Co. built forty ovens below Watt station, near Dunbar. The works above named were about all the ovens in the Connellsville region up to 1871.

The census of 1850 shows there were but four establishments making coke in the United States up to that time. In 1860, there were twenty-one establishments. In 1870 there were twenty-five. However, the number of establishments returned in 1850 is probably not correct. It is true the manufacture of coke at that time was in its infancy in this country, but it was without doubt more of an

industry than the returns of 1850 indicate. The census reports of 1850 and 1860 show that all the coke produced in the United States was made in Pennsylvania. Since 1880, the Connellsville region has produced about two-thirds, and the State of Pennsylvania about three-fourths of the entire product of the United States.

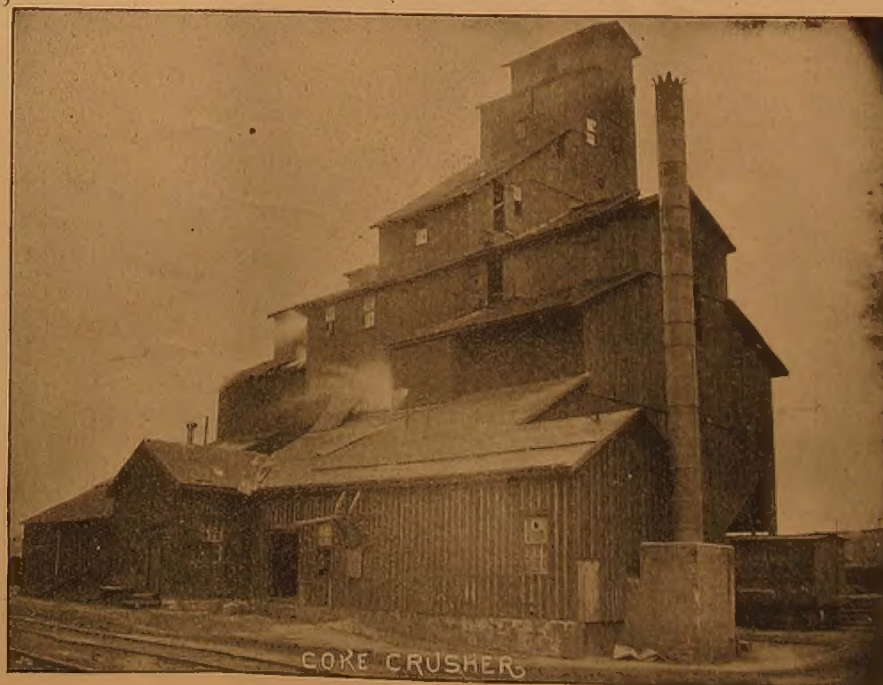
PRODUCTION AND EXTENT.

Furnacemen who look with anxiety into the future, fearing the day that they will be compelled to resort to the use of coke manufactured in regions whose coal beds are well known to be inferior to those of the Connellsville region, may take hope when they consider a few figures relative to the exhaustion of the coal in Fayette and Westmoreland counties.

The region now embraces 60,000 acres of unworked coal, which has been tested so that its extent is known with certainty. All of this area has been surveyed and the output of raw coal estimated. In addition, it may reasonably be supposed that

as the region is worked out some beds not counted upon will be encountered.

Provided the area of coal in this region is only 60,000 acres, at the present rate of exhaustion, which is about 1,200 acres a year, the region's life will still be prolonged 50 years. An average of the last ten years shows the production of coke in this region to have been about 6,000,000 tons a year. It is calculated that one acre of coal land in this region makes 5,000 tons of coke. There are numerous large tracts in the region which have never been touched as yet. In the vicinity of Leisenring and Trotter there are hundreds of acres of virgin coal, which have never yet heard the thud of the miner's pick. South of Uniontown there are likewise large tracts which have not been opened up.





The following tabulated statement shows the total number of ovens, the annual output, average price and gross revenue of the region from 1880 to date:

YEAR	TOTAL OVENS	TONS MADE	AV. PRICE	GROSS REVENUE
1880	7,211	2,205,916	1.79	\$ 3,958,017
1881	8,208	2,611,602	1.73	4,516,573
1882	9,287	3,111,324	1.47	4,473,549
1883	10,170	3,551,192	1.34	4,756,785
1884	10,543	3,102,105	1.33	4,065,698
1885	11,471	3,691,017	1.22	4,477,331
1886	12,032	4,191,521	1.19	4,987,806
1887	11,623	4,141,096	1.71	7,049,669
1888	13,975	4,665,553	1.11	5,178,081
1889	14,135	5,001,125	1.19	5,951,347
1890	16,022	6,471,150	1.14	7,376,110
1891	17,264	4,760,975	1.17	5,569,484
1892	17,260	6,369,152	1.13	7,196,137
1893	17,513	4,805,623	1.30	6,247,311
1894	17,874	5,151,151	1.60	8,241,451
1895	17,947	8,211,110	1.13	9,278,555
1896	18,151	5,111,592	1.60	8,178,547
1897	18,608	6,015,012	1.15	6,917,263

The Connellsville region is contained within a long and narrow strip of territory stretching away to the north and south of Connellsville, the basin, a distance of about 21 miles in each direction. The northern boundary is at a point a few miles south of Latrobe, Westmoreland county. Beyond this point the coal gets harder, and the coke manufactured from it does not rank in quality with the Connellsville coke.

This region is about 42 miles in length and ranges from one to five miles in width. It contains a total coal area of 87,776 acres, about 27,000 acres of which have been mined and 683 acres reserved for buildings and other purposes, leaving a total area of solid coal as yet untouched by the miner's pick, of 60,000 acres, or a sufficient quantity to keep up the supply at the present rate of production for many years to come.

This coke region has 87 plants aggregating 18,608 ovens. They vary in size from the Mayer works of 15 ovens, to the Standard plant of 901. The

ovens are fed with coal from 81 mines, varying in depth from 52 feet at Adelaide, to 542 feet at Leisenring, No. 3. The various operations give employment to about 18,000 men.

METHODS OF COKING.

As already indicated, in the manufacture of coke in this region, the beehive ovens are exclusively used, and are built in single rows or what are termed "bank ovens" and in double rows termed "block ovens." The ovens vary in size from 10 feet, 6 inches, to 12 feet in diameter, and from 7 to 8 feet high in the clear. The standard oven is the beehive with a very little improvement other than increase in size. The fire brick used in construction of the ovens are, for the most part, made within the district or adjacent. It requires 3,000 crown brick, 1,200 lining brick, 120

bottom tile, good red brick and 15 1/2 yards of cubic masonry to construct the standard ovens. About twenty special shapes of fire brick are required.

The process of coking is very simple. The coal is conveyed from the tippie to the ovens by means of a larry. These larrys are great iron wagons with bottom or side discharges. They run on a broad gauge railroad track laid on top of the ovens and are hauled either singly by mules or in trains by small locomotives. Each larry contains sufficient coal to "charge" an oven. As the the charge varies according to the size of the ovens from 120 to 165 bushels, so the larrys vary in size also. The yield of coke varies from three to five tons per oven, according to size.

It is during the burning process that the judgment of the coke maker comes into play and good judgment is necessary to make good coke.

Besides the opening in top of oven referred to, they have a large opening in the front, about 26x30 inches, called the door, through which the coke is drawn out. The door is kept closed during the process of burning. Now that the oven is charged, the next step is to level its contents, which were dropped from the larry through the opening in the top called the "trunnel head." The coal falls into the oven in pyramidal shape, and must be evenly distributed over the bottom. This is done through the door by means of a long iron rod with a scraper welded on the end of it. The oven door is now walled up with fire brick and plastered with a luting made of very fine sharp sand or good loam. In about 30 minutes a pale blue smoke slowly arises out of the trunnel head, from which the damper in the meantime has been removed.

At first the smoke is very pale and weak;



COOLING, DRAWING AND LOADING COKE.

but it gradually grows darker and stronger, and in about 30 minutes more it goes off with a puff similar to an explosion of powder, which signifies that the coal has ignited. The coal burns from the top down, and the process of burning, or as the workmen call it, "airing of the ovens," is regulated through the door by means of little holes, made around the arch in the form of a semi-circle. Through these opening the air is admitted, and the smoke and impurities are expelled through the tunnel head. The oven is "around" when the mass is properly coked. Furnace coke is usually made. It is burned 48 hours, while 72 hour coke, which is usually made from Saturday to Monday, is known as foundry coke. It was formerly considered necessary to coke the coal 72 hours to make good foundry coke, but this notion is pretty nearly exploded. Many foundrymen declare they perceive no difference, and some of them prefer 48-hour coke. When the oven is around, it looks like a mass of red hot coals. The "drawers" now take charge of the ovens, and after knocking the doors open, cool the coke by introducing water into the ovens by means of a hose with a long piece of $\frac{3}{4}$ -inch gas pipe attached to the end. When the coke is thoroughly cooled, it is drawn out of the oven and loaded directly into railroad cars. The implement used for drawing the coke is the same as that used for leveling the coal. When the ovens are first started, the coal is ignited by means of wood, red hot coals, etc., just the same as a coal fire has to be started in a stove. After repeated charging and drawing, however, the ovens become hot and the coal is ignited by the heat retained in the oven walls from the last charge. For cooling the coke, pure water is absolutely necessary to insure the purest coke.

If the water contains sulphur or other impurities, the coke absorbs them, and it becomes injurious to metals manufactured with it.

THE CONNELLSVILLE COAL BED.

The report of the United States Geological Survey on the mineral resources of the country contains the following in reference to the Connellsville region:

"The Connellsville district still remains the most important coke producing center in the United States, and one of the most important in the world. This Connellsville seam of coal yields from 8 to 10 feet of workable coal. The coal is clean, almost entirely free from slate and sulphur, remarkably soft, easily mined, uniform in quality and thickness. The purity of this coal and its chemical and physical characteristics make it peculiarly adapted for coking and is what gives it such great value. It is cheaply mined, and cokes with but little care. It is this cheapness of mining and coking that makes it possible to put coke from this district in competition with cokes and fuels in the most distant parts of the United States. The coal is carried from the mine in wagons ranging in size from $1\frac{1}{2}$ to $2\frac{1}{2}$ tons capacity. Iron larries are used for conveying the coal from the pit mouth to the ovens, and have a capacity of from six to eight tons. Wire rope haulage is principally used for transporting coal under ground, and small locomotives are used on the ovens for hauling the larries.

"The prevailing system of mining is what is known as the 'double heading pillar and room' system, and it is estimated that ninety per cent. of the coal is recovered. The drift mines are all opened from the outcrop, and are self draining. The shaft and slope mines are pumped by means of compressed air or steam.

The fan is the favorite means of ventilation. The average miner mines and loads 8 tons of coal in nine hours."

BY-PRODUCT OVENS.

Within recent years some attention has been given to a coking process by which the by-products are saved, and the gas, tar and ammonia are utilized instead of being wasted as is the case in the common beehive ovens. A block of these ovens of the Smet-Solvay type were erected in the Connellsville region in 1895. The plant is located at Dunbar, and the coke produced is used by the Dunbar Furnace Company. The plant has been operated continuously since it was built.

The essential point of a retort oven is the coking of coal in air-tight chambers. The ovens are all built in rectangular form, the retorts being above the foundation of the ovens. The coal in the common ovens is burned from the inside, while that from the new process oven is burned from gas on the outside. It is claimed that in every ton of Connellsville coal there are 10,000 cubic feet of gas, 7,000 feet of which are used for heating the ovens, the remainder being clear gain. It is also claimed that in the use of their process the coke-maker can buy his coal, manufacture it into coke, give the coke away and make a handsome profit from the sale of the by-products. Those who have made the test are satisfied with the results, and continue to use their ovens.

H. C. FRICK COKE COMPANY.

As the Connellsville coke region is the greatest coke region in the world, so is the H. C. Frick Coke Company the greatest coke producing firm in the world. To this company we are indebted for the use of the accompanying illustrations.

It owns and controls the output of two-thirds the ovens in the region, and sells three-fourths of the coke that enters the market. The annual capacity of the plant owned and controlled by it reaches the enormous aggregate of 500,000 cars, or about 9,000,000 tons. Its coal supply is entirely commensurate with its immense manufacturing capacity. Out of about 60,000 acres of available Connellsville coal remaining in the region, this company owns about 45,000. Among the first in the field and early impressed with the destiny of the region, it was the policy of the company to enlarge its holdings as fast as possible, and especially its coal land holdings, hence the kindly acreage it has acquired. It is also a matter worthy of mention that this coal lies for the most part in the very heart of the region, in or near what is technically known as the basin, hence the superior quality of the Frick coke, which has a name for excellence in every market.

The history of the H. C. Frick Coke Company is largely a history of the Connellsville region so far at least as progress and development is concerned. The officers and managers of this company, from its distinguished founder down, have been uniformly active, energetic and progressive, and to these marked characteristics of management may in a large measure be attributed the company's present commanding position in the coke trade of the region and country.

Henry Clay Frick, the head of this company, was its founder, hence the history of the company and the biography of its foundry are inseparably interwoven in the same story. As early as 1871, when a mere youth, Mr. Frick with the foresight which has characterized his whole business career, became con-

vinced that Connellsville coal made the best coke in the world, and that the future of the business was in its plying infancy. For many years he gave his entire attention and time to the development of the region and the extension of his holdings.

The officers of the H. C. Frick Coke Company are as follows: Thomas Lynch, President; M. M. Bosworth, Secretary; W. C. Magee, Vice President; G. B. Bosworth, Vice President and Treasurer; C. H. Spencer, General Agent; O. W. Kennedy, General Superintendent. Thomas Lynch, President, has been connected with the firm whose official head he now is, since the laying of the foundations of the giant industry. He rose gradually to his high position by his close application to duty in every detail of the concern, using the ability whose scope may be measured only by the growth and immensity of the enterprise.

All the other officers of the firm have been chosen for their experience and their adaptability to the offices they fill. The interests of the company have been their interests, and the name and fame of the corporation carries with it an undivided praise for their service.

CONNELLSVILLE COURIER

Through the courtesy of the *Connellsville Courier*, we are able to make valuable extracts and furnish our readers with a very interesting description of this great coke region.

Though a local weekly paper, the *Courier* has long been recognized as the highest and best authority concerning all matters relating to the coke industry of the Connellsville region. Its weekly, monthly and yearly statistics of production and output are on file in the offices of both producers and consumers, by whom they are regarded as the most accurate information obtainable on the subject, not excepting the official reports of the State and the United States. As a local paper, the *Courier* has been pronounced by those in a position to see the publications of the whole country, a model, both editorially and typographically.

CORRESPONDENCE

ARIZONA.

(From our Special Correspondent.)

BISBEE, ARIZ., May 12, '98.

The South Bisbee Copper Mining and Townsite Improvement Company are pushing their development work with the utmost vigor. Their double compartment shaft is now down 100 feet. Very satisfactory results are expected at the 200-foot level. This company has 53 claims adjoining the famous Copper Queen property.

Supt. O. B. Hardie recently brought in two carloads of ore from the Whetstones, which netted his company \$198 per car. He will continue to ship to Bisbee until his machinery is all erected.

Work is being pushed on the Mule Mountain Copper property, situated eight miles northwest of Bisbee. This is an Ohio company, and they now have a double compartment shaft down 60 feet. They have a contact of porphyry and lime, and it is considered a promising prospect.

The Montezuma Gold Mining Company are shipping several carloads of gold ore to Kansas City for treatment. President Hamburg has been in town several days attending to his company's business.

CALIFORNIA.

(From our Special Correspondent,
Garlock.)

Last Sunday, May 22nd, the Rand people shut off the supply of ore to the Henry Mill and also to the Hughes Mill, throwing about forty men out of employment. It is rumored that the ore is hereafter to be milled at Barstow.

The Visalia Mill is still running on Rand ore, but the supply may stop at any time.

A 30-horse power boiler and engine has been placed in the Moxon Mill, and the 25-horse power gas engine has been removed.

Spangler Bros.' Mill had a break down last week, but is again running day and night on their rich ore from the mine at Garden Station.

W. R. McGrew, who has been a resident of Garlock for more than a year, died this week at Dolge Hotel, and was buried at Randsburg.

A number of families have moved away for summer and times will be dull until October.

Broadwell & Co. expect to move their large stock of goods to Randsburg, as soon as their fireproof building is reconstructed.

Water has been struck in the Radmacher Mine, at the depth of 75 feet.

The Grace tunnel has reached the 300-foot mark, and is within 100 feet of the ledge.

With three of four mills idle, there will probably be some new mines opened near town.

OLD COR.

Tuolumne Mines.

The No. 2 shaft of the Trio mine is down 400 feet. The No. 1 shaft has been sunk to a much greater depth. A small mill has been recently built on the property.

The Continental Mine, near the Riverside, is being worked to a limited extent with encouraging results, by Mr. Johns. An arrastra is being used and high grade rock is being crushed.

It was reported by some of the county papers last week that new machinery was being put in at the Draper Mine. The Company have not as yet put up any machinery but will do so in the near future.

The water is all cleaned out of the Bonanza Mine this week and they are now preparing to sink. There is still considerable seepage water, which will in a few days be under control. The whistle blows correct time the same as that of Bradford's mill.

Those who are behind the movement to build a road from Columbia to American Camp should take advantage of the good weather and have work commenced. The great mining country back of Columbia would receive great benefit from this road as well as the town itself.

It is the intention of the Rawhide Mining Company to add another 40 stamps to their mill, thus increasing its capacity to 80 stamps. The company is interested in the electric plant being built at Phoenix Lake. This plant will generate 2,000 horse power from 500 inches of water and a 900 foot fall. The Rawhide Mine at present uses 150 horse power but will need more in the future.

The Riverside Mine, near Columbia, has been reopened and work is progressing energetically. A force of men are at work replacing old and decayed timbers by new ones and clearing out the mine, getting ready to work the property in a systematic manner, the car track is also being repaired. The mill will start next week, and judging from the ore in sight, the stamps will fall on good rock.

ARGUS.

NEVADA.

(From our Special Correspondent.)

SILVER PEAK, May 17, '98.

EDITOR JOURNAL:—A few days ago, the Silver Peak Mining Corporation put a force of half dozen men on their property, situated about nine miles from Silver Peak.

John Chiatovich's mine, "Mary," is producing pretty fair grade of ore; there are about sixteen men employed in same mine and 300 tons of ore on the dump. Inside of a week, will start the ten stamp mill.

Louis Chiatovich's mining property in the southern part of this state, about sixty-five miles from this town, is the coming mine. There are about 100 tons of \$100 ore waiting for the five-stamp mill, which will start in a week or so, and after crushing said 100 tons of ore, the property will be kept going. No doubt the property will become one of the finest mines of this state.

IXL.

Miscellaneous Mining News.

ALASKA.

The petroleum fields, reported discovered in the south eastern portion of Alaska, seem to be attracting considerable attention of late. An English syndicate has been formed to investigate and develop these fields and place them on the markets. H. A. Buris, an English oil expert, is on his way from London to explore the region.

ARIZONA.

Jas. Dennis is developing a chute of gold ore on his extension of the Juno Mine, near Kingman.

On the north end of the Mollie Gibson, at Chloride, Jack Flynn has located a claim and leasers are sinking a shaft to catch the ore chute from the Mollie Gibson.

The Alta, another Chloride mine, has four feet of mixed ore in the bottom of the shaft, and it is getting solid with depth. Capt. Connico is very well satisfied with the way the property is improving.

George Calder, superintendent of the Pinto Creek Mining and Smelting Company, of Globe, said they were making good progress in the development of the Yo Tambien, one of the ten claims belonging to the company.

CALIFORNIA.

EL DORADO COUNTY

At Grizzly Flat, pumping the water from the main drifts of the Mount Pleasant mine progresses. The gravel mine is working twenty men on paying gravel.

In the Hill Con. Mine, near Placerville, a 24-foot ledge was discovered, which, with the exception of an 8-foot stringer running through it, is of good milling quality.

INYO COUNTY.

The Inyo Mining Company has made a rich strike. On the 700-foot level a body of copper ore, seemingly inexhaustible in extent, was struck recently, which will make four different ores now being taken from this remarkable mine—gold, silver, lead and copper.

A smelter is now being put in, which will

add materially to the output, as heretofore all the ore was shipped either to Denver or San Francisco to be smelted. Owing to the recent copper strike, additional mechanism for smelting that ore will be put in, and within three weeks the smelter will be in operation. The pay roll of this concern now is about \$2000 a month, and after the smelter starts this will be more than doubled.

The paid-up stock amounts to \$22,000, and the mine has been a heavy ore shipper for more than a year past.

KERN COUNTY.

The Desert Mines.

The King Solomon mine has been improved by an air shaft from the 315 foot level.

"Paddy" Miles and "Boss" Buckley are taking out some low grade ore from the "Sunrise" mine near the depot.

Very rich ore was milled at the Red Dog mill the past week. It was from the Butte mine on Bull hill.

A deal is now pending to sell Tam O'Shanter and other mines to a rich syndicate, which will be closed inside of 60 days, probably there being some dispute about the title.

About a score of men are employed at the St. Elmo mine, and ore is being shipped to the mill at Victor almost daily, and several carloads some days. Wythe Walker is in charge as before and is well pleased with the ore being taken out.

The old Radmacher mine is showing up as good as expected, if not better, and can be said to be one of the best mines in the desert country. Water was found in it on sinking, but no trouble has been experienced in handling it.

A mill with concentrators is talked of, but part of our mine owners have arranged to ship ore to Barstow.—*The Rand.*

LOS ANGELES COUNTY.

A Novel Enterprise.

A novel co-operative mining and industrial enterprise has recently been organized in Los Angeles, under the laws of California. It is claimed that it will result in great development of the extensive gold mining, petroleum and fire clay deposits and water supply of Placerita, Creek and Canyon, near Newhall, besides furnishing remunerative employment to individuals and families in moderate circumstances. A lease has been secured for twenty years of 500 acres, and location made of 400 acres more of the above lands, to which are attached several valuable water rights, reservoir sites, mill sites, rights-of-way for ditches, and five miles of good ditches already constructed and ready for use; also a complete hydraulic plant, sluice boxes and every necessary for placer mining. There are many houses and tents on the ground, and more will be erected when necessary. A small membership secures an equal interest in all the industries inaugurated. Land for residences, fuel and water are furnished free to all workers; also wages and dividends; members not workers receiving dividends only. J. G. Evans, 531 and 533 Byrne Building, is president and general manager of the company.

MONO COUNTY.

From Mono county comes news of more cyanide plants. A hydraulic outfit is to be located between Mono Lake and Lundy.

NEVADA COUNTY.

The Champion Mine has temporarily shut down the 40-stamp mill pending the construction of a new flume. The Reddick gravel mine continues its output of good gravel.

Poorman & Hastings, operating the Milliken Ranch drift mine, near Nevada City, struck the channel last week. The Manzanita Company, adjoining them on the west, will resume operations.

PLACER COUNTY.

The Morning Star and Big Dipper drift gravel mines are equipped with machinery for use of steam power to run their stamp mills. Much development work will be prosecuted this season by companies owning gravel and quartz properties on the Upper Iowa Hill and Forest Hill Divides.

RIVERSIDE COUNTY.

A 300-foot tunnel is being run on the Brooklyn Mine, Dale district. The Brooklyn belongs to H. B. Botsford, and when the tunnel is completed, it will tap the bottom of the shaft which is down 112 feet.

SAN BERNARDINO COUNTY.

The camp at Summit Springs near Manvel is growing. Three parties working there are taking out considerable rich ore.

A test of two tons of ore from the Star and Crescent Company's property, situated in the Providence district of San Bernardino County, was made at Los Angeles last week.

W. H. Emerson and J. Ross, Jr., have purchased George Root's lead property, on Bonanza Mountain, near Goode Springs and the old Exchequer Mine, a few miles north of Homer.—*San Bernardino Transcript*.

TUOLUMNE COUNTY.

Tuolumne's Gold Output.

According to the report recently filed by Charles G. Yale, statistician to the United States mint at San Francisco, Tuolumne's yield of Gold in 1897 was \$1,809,572, thus making this county second only to Nevada in point of production. The same authority put this county in the seventh place in 1896, with a total output of \$1,070,142. Nevada county is credited with a billion output for '97 of \$1,885,251, while the previous year it was \$2,380,756. This, according to percentage statistics published by Mr. N. C. Ray, of Coulterville, shows that Tuolumne's increase for '97 over '96 was 69.10 per cent, while Nevada has suffered a decrease of 20.80 per cent during the same period. All of the above figures are by men who have studied the question and should know what they are talking about.

COLORADO.

(Extracts from Mining Investor.)

Three mills, the Gale, the Cash and the Gray Eagle, are in operation in the Gold Hill District of Boulder County, and have all the ore they can handle, and a fourth will soon be started to handle concentrating ores, and will be equipped with six Wilsley tables.

That the smelting ore output is steadily increasing is shown by the shipments of the Kilton ore sampler, at Breckenridge, Summit County, during April. 350 tons were shipped from this sampler alone, and the first week in this month shows close to 100 tons on hand.

Statements of ore shipments show that Gilpin county is keeping up regular monthly in-

crease over last year. For the month of April there were shipped from Black Hawk 342 car loads of mineral, or 5,472 tons.

During the month of April, 16 mills and mines of Empire, Clear Creek County's gold camp, shipped 19 carloads of ore, averaging from 15 to 20 tons per car. Shipments in April, 1897, were five cars. Hence the gain in favor of last month equals 357 per cent.

The week's shipments from Union, El Paso County, were as follows: From the Moore & Wilson lease on the Pike's Peak, seven and a quarter tons, value \$57.40 a ton; two and a quarter tons, value \$16.81; one ton, value \$35.24; six tons, value \$32.87. From the Hawker lease on the Pike's Peak dump, six tons, value \$84.90 per ton. From the Clements lease on the Porcupine dump, four and three-quarter tons, value \$85.70. From the Smith and Cavanaugh lease on the Delmonico four tons, value \$19.76. From the Orpha May, a small shipment of half a ton, value \$499.20; four and a half tons, value \$42.80; one and a half tons, value \$117, and nine and a half tons, value \$40.50.

IDAHO.

A ripple of excitement was felt in Florence when the report came in last week that the Poorman had penetrated a ledge and rich body of ore measuring between 12 and 15 feet in width in their tunnel, which is now beyond the 500-foot mark. Assays as high as \$300 were had from the vein, which will average between \$50 and \$60 for its entire width.

The Mikado, near Florence, still continues to attract attention and has lost none of its prestige gained early last winter, when it announced a remarkably rich strike of rock running \$1 a pound. They are still in the same chute of ore and in the breast of a 60-foot drift 14 inches of very high grade ore is exposed. Work in the shaft is temporarily suspended pending the arrival of a hoist. In the meantime development is being pushed in the tunnel.

Smith and Krewson are preparing to develop the Cripple Creek as soon as the snow goes off. This property lies in the basin two miles from Florence towards Salmon Breaks, and has a very promising showing.

MINNESOTA.

Pillsbury Iron Company.—At the Pillsbury Iron Company's consolidated mine, 125 men and 20 teams are busy stripping. The mine has just shipped its first cargo.

Seller's Ore Company's Mine has resumed work, with about 125 men underground. At least 100,000 tons will be mined.

MISSOURI.

The Hayseed Mining Company, composed of farmers, is opening up a new territory, four miles northwest of Carthage. It has a 40-acre lease of the Weeks land, and has sunk a shaft 65 feet.

Messrs. Jacobs, Frye & Co. have a lease of 40 acres on Mrs. Cisna's land, two miles east of Joplin, and are building a large steam concentrating plant that will handle over 100 tons of dirt each shift. They have opened up a 27-foot face of lead and zinc ore on shooting ground.—*E. & M. Journal*.

MONTANA.

The Perkins boys loaded a car of ore last week from their new mine on Duck creek.

Jennings, Steele & Snyder shipped a car of ore from the Whippoorwill, at Neihart, Thursday of last week.

Charles Conners accompanied a car load of ore to the smelter Tuesday from Neihart, from the Broadwater lease of Frank Kempfer, Aaron Johnson and himself.

The boys who have a lease on the O'Brien No. 3 lead of the Queen, at Neihart, received favorite returns from a few tons which they shipped, and they started at work again with renewed energy.

Jennings & Steele have been steadily working on their lease at the Whipperwill at Neihart, and have loaded about 35 tons. The ore is rich in copper, besides lead and silver. Charles Riley ships a few tons from his lease on the 88, and Joe Hegener also ships a few tons from his claim, enough to finish out two cars.—*Helena Independent*.

NEVADA.

A sale of the Curieux group of mines at Mountain City, Elko county, is to be effected to C. D. Lane. The price agreed upon is \$150,000. More than that amount is said to be uncovered.

A new mining camp which may be heard of now and then is called Colton. It is in the southern end of Nevada, about forty miles southeast of the lower end of Death Valley. The principal mine is being developed by Collins, Noble & Co., with a force of twenty men and it is claimed to show eight feet of \$40 ore. There are now fifty men in camp.

A \$3300 gold brick was sent to Salt Lake from the Dexter mine at Tuscarora a few days ago.

Superintendent I. Folconer of the Cortez mine in Landers county, has arranged an exhibit of choice specimens of ore from the Garrison mine, to be sent to the Omaha exposition.

NEW MEXICO.

The work in the Albermarle mine at Bland now consists of drifting on the lead and sinking the main shaft, the ore constantly improving in value. The construction of the mill continues with the usual briskness. The air-compressor is about ready for use and will be used in operating Rand drills in the mine work.—*Herald*.

Output of Hillsboro gold mines for the week ending Thursday, May 19th, 1898, as reported for *The Advocate*:

	Tons
Wicks.....	10
Richmond.....	10
Happy Jack.....	5
Snake Group.....	40
Opportunity.....	10
Sherman.....	5
Prosper.....	5
Eighty five.....	—
Rex (silver-lead).....	5

Total output since Jan. 1, 1898—3,230.

OREGON.

Albert Parker and Mr. Conner are working some fine placer ground on Taylor Creek and bringing out considerable gold.

I. Swauk, of Starveout, struck a pocket last week from which he took over \$300, and is still finding more. George Bliff is developing a claim in the district which promises to be a good mine. Some \$1100 was taken out last winter.

The San Francisco Co., operating the Wright and Eastlick mines at Oro Fino, are working them energetically with the Evans elevators and giants, which are operated with considerably less water than the old elevators formerly used. The company has still a good supply of water in the ditch from Salmon Mountain, but the season will be shorter than usual.—*Oregon Mining Journal*.

SOUTH DAKOTA.

The Carbonate District will show more than usual developments during the season.

The American Express property, under the management of Mr. Jamison is showing excellent ore chutes as work is extended into the hill.

Sinking on the Sunnyside Mine, two miles north of Hill City is improving as depth is reached, and we were recently informed that the deepest level is now over 300 feet.

It is reported that Richard Wheelock, of Harney City, one and a half miles below the town of Keystone, has a 40-foot vein of concentrating ore, which will average \$10 to the ton in gold.—*Black Hill Mining Review*.

UTAH.

Ajax Company is in with a shipment of 100 tons of high grade copper ore. Bullion-Beck declared its dividend of 10 cents per share, or \$10,000, making \$2,485,000 to date. The dividend payable May 16th. The mine is looking well and gives promise of greatly increasing shipments in the near future. A fine vein of copper ore has been encountered in one of the lower levels of the Centennial-Eureka, and is an exceedingly encouraging feature. The regular ore shipments are being maintained, but there is no increase and dividend resumption is not expected until the output is greater.

Grand Central is undoubtedly the present great bonanza of the Tintic District. Developments in this district heretofore have demonstrated the vast quantity and high quality of the ore found on this lode, and one of these famous ore chutes has been encountered in the Grand Central. It is reported that the mine shipped \$85,000 worth of ore last month, a truly magnificent showing and an indication of the mine's capabilities as a producer.

WASHINGTON.

On the Copper King, situated about four and a half miles from Chewelah, the shaft is down 100 feet in hematite of iron, and from the bottom a crosscut west of 135 feet encountered two leads of malachite. The crosscut going east went into porphyry, the formation being slate and granite. This ore body was followed 40 feet, when spar was encountered. Pockets of extremely high-grade ore have been encountered in the course of devel-

opment, containing black oxide of copper which assayed as high as \$86 in gold, with 72 ounces of silver and 45 per cent copper. The Montana Ore Purchasing Company has the property under bond.

FOREIGN MINING NEWS

BRITISH COLUMBIA.

It is believed in well-informed mining circles that the British America Corporation, the big London syndicate, which has been buying so many mining properties in southern British Columbia, is about to take over the Le Roi mine. The consideration is \$3,000,000, or \$6 a share. The terms are \$500,000 down, and \$500,000 monthly until the entire \$3,000,000 has been paid.

LOWER CALIFORNIA.

The Ybarra Mining and Milling Company is engaged in the construction of a five stamp mill at Colmalli and development work is going on all along the line.

MEXICO.

Reports of rich gold discoveries are being received from the Guanopa district, 100 miles southwest of Casas Grandes, and there is every reason to believe that it will soon be one of the most important camps in the country.

The La Reina Mining Company of Cusi-huiriachie, are putting in new machinery and getting ready for greater development. It is reported that the properties of the company will be sold on the stock basis at the rate of \$7,500 a share. Single shares are now held at \$10,000 each.

Mexico's copper production is growing at a rapid rate. New mines have been discovered in several parts of the republic, and reports from the Guerrero fields agree that they are rich in copper as well as gold. During December of last year, Mexico's exportation of copper reached a valuation of nearly \$1,000,000, which was an increase of almost 100 per cent.—*Chihuahua Enterprise*.

A Flourishing Mining Town.

Mapimi, located on the Mexican Central Railway, is probably as well known, among mining men as any district in Mexico. A goodly number of reasons could be given for this. Early in the history of mining in the Republic the Spaniards worked rich and well-known silver mines in this district, and in and around the town of Mapimi. Following these came the "Compania Minera de Penoles" which has done a great deal to make known the natural richness of the district.

Without going into technical details, a description of this well-known mining property may be of interest. The above mentioned company has a nominal capital of \$250,000, divided into 2,500 shares and the present enhanced value of the shares is owing in part to the richness of the mines which the company owns, and in part to the able management of the same. To-day the company pays \$20 a month dividends on the entire stock, and for some years past it has paid \$10 a month dividend. According to information

received from a reliable source, the dividend will shortly be still more increased.

In November last the directors of the company, J. M. Bermejillo, W. Rohmer and Rafael Salcido, in company with the well-known attorney, Pablo Macedo, comisario of the company, Messrs. Nickerson and Hoffman, of the Mexican Central Railway, and various others were in Mapimi, and at the property of the Penoles Mining Company to inaugurate the new smelters erected by that company. These smelters meant for the company an outlay of \$150,000. The new smelters consist of four furnaces which, with all the accessories and machinery were furnished by the well-known firm of Fraser & Chalmers. The capacity of each furnace is about 60 tons of ore in every 24 hours, and everything in connection with their construction and finish, even to the slightest detail, is of the very latest improved pattern and make.

In addition to the putting in of these four new furnaces, the company has built a narrow gauge line from the station of Mapimi, on the Mexican Central Railway, to the town proper, and from the town to the mines. In reality there are two lines of railway. One from Mapimi station to the town of Mapimi, 24 kilometer (a kilometer is 3,280.7 feet) in length 30-inch gauge and about from 1 to 3 per cent grade, and a second line running from the town of Mapimi, where the smelters are located, to the Ojuelo mine, one of the principal mines of the company. The entire length of the latter road is nine kilometer, of which three kilometer is a "rack road," of which the maximum grade is 14 per cent. These three kilometer of rack road are very interesting from an engineering point of view, from the fact that this road is the only one of its kind, so far as the writer knows, in all of Spanish America. The ore is loaded at the mouth of the shaft, and the "rack road" takes it to the smelters. This road has now been in operation some time and the management pronounces it a decided success. It may not be out of place to say here that the rack road is constructed on the system known as the "Abt patent."

The Penoles Mining Company, in addition to the Ojuelo mine are also owners of the Socavon, San Ignacio, San Vicente, Santa Rita, San Judas, etc., all of which mines are in the same district.

GENERAL NEWS

The Federation of Miners of the west proposes establishing a home for aged and broken-down miners. The building is to cost \$50,000, and the intention is to have the institution supported by the miners' unions of Arizona, Nevada, Montana, Utah and Colorado. A similar idea has been affirmatively acted upon by the California State Miners' Association, but has not as yet assumed tangible shape.

Dr. M. R. McCrory is hauling 20 tons of ore down the mountain from the Empire, at Elizabethtown, N. M., to be hauled to Hematite mill, which will start up next week. The Doctor is sanguine of the success of the Empire and satisfied that Hematite mill will treat the ore.

It is said that some of the ore of the South Bisbee Copper Co., runs as high as 79.4 per cent copper, 135 ounces silver and a few dollars gold to the ton.

TABLE VII.—Cost of Milling in 1887-8 at Homestake and Golden Star Mills

ITEMS.	Homestake Mill (96,790 tons treated)		Golden Star Mill (146,565 tons treated)	
	Amount Expended	Cost per ton	Amount Expended	Cost per ton
Labor	\$24,789.90	\$0.2561	\$31,338.60	\$0.2138
Supplies	1,263.71	0.0130	1,149.95	0.0079
Water	16,731.37	0.1729	25,097.10	0.1712
Wood	26,773.50	0.2766	40,156.50	0.2739
Machinery	8,924.06	0.0922	17,884.96	0.1220
Oil	1,052.69	0.0109	1,233.21	0.0084
Candles	156.00	0.0016	214.50	0.0014
Quicksilver	1,001.25	0.0103	3,701.05	0.0252
Lumber	684.06	0.0070	799.16	0.0054
Total	\$81,376.54	\$0.8406	\$121,574.73	\$0.8292

GOLD MILLING IN THE BLACK HILLS.

BY PROF. H. O. TOPMAN,
Of the Dakota School of Mines, Rapid City, Dakota.

[Continued from our issues of Feb. 1st, 15th, Mar. 1st 15th, and May 1st and 15th.]

Subjects treated upon in preceding issues are as follows:

I. THE ORES.

Character of the Ores.

Sorting of the Ore.

II. ENUMERATION OF MILLS.

III. OUTLINE OF PLANT AND PROCESS.

IV. GENERAL FEATURES OF THE MILLS.

Distribution of Power.

Supply of Water and Fuel.

Auxiliary Arrangements.

V. THE MILLS IN DETAIL.

Grizzlies.

Rock Breakers.

Ore Bins.

Feeders.

Battery Foundations, Frames and Guides.

Battery Frames.

Guides.

Mortars.

Dies.

Screens.

Stamps.

Cams and Cam-Shafts.

Crushing Capacity.

Apron Plates.

Memory Traps.

Shute Boxes.

VI. LABOR IN THE MILLS.

Daily Collecting of Amalgam and Dressing of Plates.

The Clean-up.

Retorting and Melting.

VII. WORKING RESULTS.

In comparing the cost of milling in the 80 and 120-stamp mills, it seems strange that there should be so little difference. Special causes must have affected this year's work, for the cost per ton in 1886 was \$1.3018 and \$0.7770, respectively.

The cost of milling at the Caledonia Mill for 1887-88 was \$0.87 per ton, $\frac{1}{3}$ going to labor and $\frac{2}{3}$ to material. This is a low figure, if we consider that the mill has only 60 stamps and that the ore treated is very hard in comparison with any Homestake rock.

VIII. CONCLUSIONS.

Two striking features are presented by the foregoing review: the simplicity and effectiveness of the methods by which the free gold is extracted; and the evident waste of sulphurets in the tailings. These sulphurets appear according to the figures given above (3 per cent., assaying \$24 per ton) to be quite rich enough to repay working.

A simple and cheap method of concentra-

tion, for the large quantities to be treated, would probably be as follows: The pulp after passing over a series of spitzluten, which would sort out the coarse sands, would overflow into a series of spitzkasten, and the overflow of these would be waste. The coarse sands, sorted out by the spitzluten, would contain, according to experiments made in 1885 on the large heap of concentrates, free gold, which would be recovered by crushing them wet in rolls or a Chilian mill, allowing the pulp to flow over amalgamated plates, and then pass over a separate series of classifiers or else go back to the main system. The graded pulp obtained by the different spitzkasten, would be separated on continuous round tables, into pure concentrates, middlings and waste.

The middlings would be worked separately, or be pumped back to the main system of spitzkasten. The cost of concentrating the tailings would probably not exceed \$1 per ton of sulphurets.

The method of working these concentrates would be that of barrel-chlorination, using bleaching powder and sulphuric acid to generate the chlorine. In a paper read before the Institute at the Buffalo meeting, 1888, Prof. William B. Phillips says the cost of dead-roasting on a 12-foot revolving hearth, at the Phoenix mines, North Carolina, is \$2.03 and \$2.18 per ton. A combination of two systems of furnaces would probably accomplish this dead-roasting at a proportionately cheaper rate at the mills, where wood is \$6 a cord and labor \$3 and \$3.50 per day. The Spense automatic desulphurizing roaster would do the preliminary roasting cheaply, and the revolving hearth would effectually dead-roast large quantities of ore, whose sulphur had been nearly all eliminated. Prof. Phillips further gives the cost of chlorinating at \$2.66 per ton of concentrates. This figure would have to be considerably increased for the Homestake and other mills. The total cost would probably be not over \$8 for the ton of concentrates.

In closing this paper, the writer desires to express his thanks for the management of the Homestake and Caledonia mills for their courtesy in allowing him the run of the works.

The Outlook for Copper.

While the production of copper in this country for the first three months of this year has shown a material increase over previous years, the increase in export of the metal over the corresponding period of previous years has been even greater. At the same time European production of the metal, for some reason or other, continues to show a heavy falling off. United States production

of copper (long tons) for March, 1898, aggregated 20,381 tons, compared with 18,572 tons for the previous month, and 18,283 tons March, 1897. Exports of copper from the United States (long tons) for March, 1898, aggregated 13,741 tons compared with 9,611 the previous month and 11,232 tons March, 1897. On the other hand, European copper production (long tons) for March, 1898, aggregated 7,121 tons, compared with 7,304 tons the previous month, and 8,358 tons March, 1898. In other words, the export of copper from the United States in the month of March, 1898, increased over March, 1897, by 22.1 per cent. In the same month the production of the United States increased by only 11.10 per cent, while the European production fell off by 14.8 per cent. With the European production decreasing at a greater rate than the United States production increased, and with the export movement from this country increasing two-fold over the production, and with visible supplies both here and abroad at the lowest for two years, it would seem that unless there was an unexpected let up in the demand, copper would become a scarce article before this year is over and possibly sell at extremely high prices. The contingency of war cutting off the Spanish supply of the metal, would but tend to aggravate the situation. In this situation the timid holders of railway and industrial securities cannot do better than liquidate and invest the proceeds in good copper shares, where dividends are assured.

PERSONAL NEWS ITEMS

A. E. LINDROTH has been appointed engineer in charge of the Link Belt Machinery Co.'s branch in Denver, Colo.

O. P. POSEY, the much esteemed general manager of the Cochet Gold Mining Company, in company with F. M. JOHNSON, who is superintending the construction of the big Allendale mill, arrived in Bland last week to look over the property.

H. C. DONNELLY, a prominent mining man from Boston is investigating mining property in the unknown district near Pactola, Pennington county, South Dakota.

W. R. CHADBOURNE, Gen. Mgr. Mikado mine, Leadville, Colo., is examining the old Lindsay mine at Maybert, Cal.

WM. P. KIMBER, of the Lake Superior copper country, has been spending several days in Butte, Mon.

DR. F. R. CARPENTER, general manager of the D. & D. Co., of Deadwood, S. D., started last week for Wilmington, Delaware, to confer with the Swift Bros. on business connected with the rebuilding of the smelter.

HON. THOMAS G. MERRILL, the eminent bimetalist and mining man, was in Butte, Mont., the first of the week, en route to Helena from Salt Lake City.

A. J. RYNDOLPH has returned to London after buying No. 27, Dominion creek, in the Klondyke district, for a London company and making other mining deals at San Francisco, Cal.

JOHN OLDFIELD of Boston, Mass., who has been visiting the Black Hills, South Dakota, has left for home.

MARCUS DALY added \$15,000 to an equal amount furnished by the State for Montana's exhibit at Omaha.

J. W. JOHNSON of Denver, Colo., has been investigating mining properties in the Black Hills, South Dakota, for the past week.

R. H. PORTERFIELD of the Rison Iron Works of San Francisco is at Breckenridge, Colo., superintending the erection of two gold d. m. s.

A. W. DAVIS of the Viznaga Mines at Mexican Gulch near Boscunda, Lower California, Mexico, has returned to Los Angeles, Cal.

JESSE R. GRANT of San Diego well known in mining circles, was in Los Angeles last week.

THO. H. COMSTOCK, M. E., is visiting his mining properties near Prescott, Arizona.

The new P. S. Surveyor General for California is MR. GRAVER, who takes the place of W. S. GRINN. The new incumbent has progressive ideas of the importance of the mining industry and has set his eyes toward the future, which was allowed to roll into arrears in the San Francisco office.

\$1.12 1/2 to \$1.25 Oxalic acid, \$6.50 607.00 Mixed acids, according to mixture. Sulphuric acid, 66 per cent., \$1.10 to \$1.75. Chamber acid, 50° \$11.50 to \$12 per ton at factory. Blue Vitriol, \$3.50 to \$1.00 according to grade and order.

BRIMSTONE

Demand continues moderate. No arrivals are noted, and prices are about as last quoted. Best unmined second, \$37.50 for spot, while thirds are \$35.00 per ton, respectively.

MURIATE OF POTASH.

We quote per 100 lbs. on basis of 80 per cent., as follows: New York and Boston, \$1.75 for 80@85 per cent., and \$1.78c. for 95 per cent.; Norfolk and Philadelphia, \$1.76 1/2 for 80@85 per cent., and \$1.79 1/2 for 95 per cent.; Charleston, Savannah, Wilmington, N. C. and New Orleans, \$1.78 1/2 for 80@85 per cent., and \$1.81 1/2 for 95 per cent. All for lots of 50 tons and upward.

RAINIT.

Invoice weights as taken at port of shipment per ton of 2,240 lbs. testing 12.4 per cent. actual potash, equivalent to 23 per cent. sulphate of potash, \$8.55 for New York and Boston; \$8.90 for Norfolk, and \$9.05 for Charleston, Savannah, Wilmington, N. C. and New Orleans. Actual weights, ex vessel at port of importation are quoted \$8.80, \$9.15 and \$9.30, respectively.

NITRATE OF SODA.

Market is still high, and sales of spot nitrate are quoted at \$1.95@2, but quotations are up to \$2 per 100 lbs; futures range from \$1.75 upward.

FINANCIAL NOTES.

The statement of the United States Treasury, on Thursday, May 19th, shows balances in excess of outstanding certificates as below, comparison being made with the statement for the corresponding date last week:

	May 12	May 19	Change
Gold	\$1,000,000	\$1,000,000	0
Silver	1,000,000	1,000,000	0
Legal Tenders	1,000,000	1,000,000	0
Treasury Notes	1,000,000	1,000,000	0
etc.	1,000,000	1,000,000	0
Totals	\$4,000,000	\$4,000,000	0

Treasury deposits with national banks amounted to \$28,737,489, an increase of \$246,078 during this week.

Average Monthly Prices of Silver.

In New York per ounce Troy, from January 1st, 1893, and for the years 1897 and 1899:

Month	1896	1897	1899
Jan.	66.77	64.70	67.11
Feb.	66.77	64.67	67.07
March	66.77	64.60	67.40
April	66.77	64.60	67.40
May	66.77	64.60	67.40
June	66.77	64.60	67.40
July	66.77	64.60	67.40
August	66.77	64.60	67.40
September	66.77	64.60	67.40
October	66.77	64.60	67.40
November	66.77	64.60	67.40
December	66.77	64.60	67.40
Year	66.77	64.60	67.40

Gold and Silver Exports and Imports.

At all United States ports, April, 1898, and years from January 1st, 1898 and 1897:

	Gold Exp.	Gold Imp.	Silver Exp.	Silver Imp.
April 1898	\$1,310,384	\$3,258,074	\$ 100	\$223,184
1897	5,561,874	23,910,594	77,441	2,293,637
1897	7,910,115	2,541,939	91,869	1,399,054

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K & K PRINTING

INCORPORATED MINES PAYING DIVIDENDS.

NAMES OF MINES	LOCATION	No. of Shares	Capital Stock	Par Value	Amount of last Dividend	Date of Last Dividend	Total Amount Paid in Dividends	Kind of Mineral Produced
Acton Cons.	California	100,000	\$ 500,000	\$ 5	\$ 10	Sept 1897	\$ 110,000	Q.
Adams	Colorado	150,000	1,500,000	10	04	October 1895	893,500	S, L, C.
Alaska, Treadwell	Alaska	200,000	5,000,000	25	35½	October, 1897	3,250,000	G.
Alaska Mexican	Alaska	200,000	1,000,000	5	10	Oct., 1897	207,031	G.
Alice	Montana	400,000	10,000,000	25	03	Oct 1897	1,055,000	G.
Anaconda	Montana	1,200,000	30,000,000	25	1 25	May 1897	3,750,000	C.
Anchuria Leland	Colorado	600,000	600,000	1	01	Oct 1897	81,000	G.
American Gold	Colorado	300,000	3,000,000	10	02	Aug 1897	273,000	G, S, L.
Atlantic	Michigan	40,000	1,000,000	25	1 00	Feb. 1897	740,000	S.
Bald Butte	Montana	250,000	250,000	1	03	Sept 1897	512,500	G, C, S.
Bangkok C-Bell	Colorado	600,000	600,000	1	01	July 1896	107,510	S, L, C.
Big Six	Colorado	500,000	500,000	1	00½	April 1897	5,000	G, S.
Boston & Montana	Montana	150,000	3,750,000	25	3 00	Aug 1897	6,275,000	G, C, S.
Bullion Beck and Champion	Utah	100,000	1,000,000	10	50	Mar 1897	2,465,000	G, S.
Bunker Hill and S	Idaho	300,000	3,000,000	10	05	Oct 1897	321,000	S, L.
Cariboo	British Col.	800,000	800,000	1	02	May 1897	156,965	G.
C. O. D.	Colorado	50,000	500,000	1	01	March 1896	25,000	G.
Calumet & Hecla	Michigan	10,000	2,500,000	25	10 00	Oct. 1897	50,850,000	C.
Centennial Eureka	Utah	30,000	1,500,000	50	1 00	Mar 1897	2,010,000	S, L.
Central Lead	Missouri	4,000	400,000	100	1 00	Oct 1897	16,000	L.
Charleston	South Car.	10,000	1,000,000	100	1 00	Feb 1897	150,000	G.
Champion	California	34,000	340,000	10	25	Aug 1897	278,200	G.
Consolidated, California and Virginia	Nevada	216,000	21,600,000	100	25	March 1895	3,592,800	G, S.
Copper Queen Consolidated	Arizona	200,000	2,000,000	10	25	June 1895	1,910,000	C.
Crescent	Utah	24,000	600,000	25		July 1897	280,000	
Daly	Utah	150,000	3,000,000	20	25	Mar 1897	2,925,000	S, L.
Deadwood Terra	Dakota	200,000	5,000,000	25	40	June 1897	1,320,000	G.
De Lamar	Idaho	400,000	2,000,000	5	25	Jan 1897	2,250,100	S, L.
Della S.	Colorado	1,000,000	1,000,000	1	10	Jan 1897	60,000	G.
Doe Run	Missouri	5,000	500,000	100	50	October 1897		L.
Dalton and Lark	Utah	2,500,000	2,500,000	1	00½	August 1896	87,500	S, L.
Elkton Consolidated	Colorado	1,250,000	1,250,000	1	03	Sept 1897	361,960	G, S.
El Paso	Colorado	850,000	850,000	1	01	Aug 1897	5,393	G, S.
Florence	Montana	500,000	2,500,000	5	01	May 1897	182,530	S.
Galena	Utah	100,000	1,000,000	10	05	Jan. 1897	71,000	G, S, L.
Garfield Grouse	Colorado	1,200,000	1,200,000	1	01	Feb. 1897	24,000	G.
Geyser-Marion	Utah	300,000	1,500,000	5	03	Nov 1897	54,000	G.
Golden Eagle	Colorado	1,000,000	1,000,000	1	01	Sep. 1896	10,000	G.
Golden Fleece	Colorado	600,000	600,000	1	01	Feb. 1897	569,179	G, S.
Gold Coin	Colorado	200,000	1,000,000	5	05	Aug 1897	150,000	G, S.
Gold and Globe	Colorado	750,000	750,000	1	3-10	July 1897	51,825	G.
Hecla Consolidated	Montana	30,000	1,500,000	50	50	Feb 1897	2,175,000	S, G, L, C.
Helena & Frisco	Idaho	500,000	2,500,000	5	04	August 1896	475,000	S, L.
Highland	S. Dakota	100,000	10,000,000	100	20	Oct 1897	3,424,918	G.
Holy Terror	S. Dakota	300,000	300,000	1	03	Sept 1897	18,000	G.
Homestake	Dakota	125,000	12,500,000	100	25	Oct. 1897	6,431,250	S.
Hope	Montana	100,000	1,000,000	10	10	Nov 1897	782,252	S.
Horn Silver	Utah	400,000	10,000,000	25	12½	January 1896	5,080,000	S, L.
Ida o.	Brit. Col.	500,000	500,000	1	05	Mar 1897	152,000	
Iow	Colorado	1,000,000	1,000,000	1	00½	Oct 1897	65,000	G.
Iron Mountain	Montana	500,000	5,000,000	10	01	Sept 1897	497,500	S.
Isabella	Colorado	2,250,000	225,000	100	00½	June 1897	270,000	G.
Kearsarge	Michigan	40,000	1,000,000	25	10	Aug 1897	160,000	C.
Last Chance	Brit. Col.	500,000	500,000	1	04	Jan 1897	42,000	S, L.
Le Roi	British Col.	500,000	2,500,000	5	10	Oct 1897	825,000	G.
Minnesota	Minnesota	185,000	18,500,000	100	1 50	July 1896	3,240,000	I.
Montana Ore Purchasing	Montana	40,000	1,000,000	25	01	October 1897	640,000	
Moose	Colorado	600,000	600,000	1	01	January 1896	186,000	G.
Morning Star	California	2,400	240,000	100	8 00½	Sept. 1897	558,600	G.
Mt. Rosa	Colorado	1,000,000	1,000,000	1	00½	Oct. 1896	30,000	G.
Mercur	Utah	200,000	5,000,000	25	12	Oct 1897	825,000	G.
Mammoth	Utah	400,000	10,000,000	25	05½	Nov. 1896	1,150,000	G, S, O.
Moon Anchor Gold	Colorado	600,000	600,000	1	02	Nov 1897	63,000	G.
New Elkhorn	Colorado	300,000	1,500,000	5	24	Sep. 1896	72,000	G.
New York & Hon. Rosario	Central A.	150,000	1,500,000	10	10	Oct. 1897	832,500	S, G.
Napa	California	100,000	700,000	7	20	Oct 1897	870,000	Q.
New Idria Quicksilver	California	100,000	500,000	5	10	Sept 1897	20,000	Q.
Ontario	Utah	150,000	15,000,000	100	10	June 1897	13,445,000	S, L.
Oscola	Michigan	50,000	1,250,000	25	1 00	June 1897	2,172,500	C.
Parrot	Montana	230,000	2,300,000	10	08	June 1897	1,650,122	G.
Pennsylvania Consolidated	California	51,500	5,150,000	10	05	Sept 1897	20,750	G, S.
Portland	Colorado	3,000,000	3,000,000	1	01½	Oct 1897	1,183,000	G.
Princess	Colorado	1,000,000	1,000,000	1	00	Feb 1897	45,000	G.
Quincy	Idaho	100,000	2,500,000	25	4 00	August 1897	9,470,000	O.
Rambler-Cariboo	Brit. Col.	1,000,000	1,000,000	1	02	April 1897	40,000	
Reco	Brit. Col.	1,000,000	1,000,000	1	50½	May 1897	187,500	S, L.
Sacramento	Utah	1,000,000	5,000,000	5	00	March 1897	22,000	G.
Small Hopes Consolidated	Colorado	250,000	5,000,000	20	10	Mar 1896	3,275,000	S.
South Swansea	Utah	150,000	150,000	1	05	Oct 1897	59,940	S, L.
Standard	California	200,000	20,000,000	100	10	Sept 1897	3,757,883	G, S.
St. Joseph	Missouri	250,000	2,500,000	10	15	Oct 1897	24,000	L.
Silver King	Utah	150,000	3,000,000	20	25	October 1897	1,237,500	S, L, G.
Slocan Star	Brit. Col.	2,000,000	1,000,000	0.50	05	Mar 1897	350,000	
Smuggler Union	Colorado	50,000	5,000,000	100	1.00	Oct 1896	150,000	G, S.
Swansea	Utah	100,000	500,000	5	05	Oct 1897	61,500	S, L.
Tom Boy	Colorado	200,000	2,000,000	10	20	March 1896	410,000	G.
Tamarack	Michigan	60,000	1,500,000	15	3 00	June 1897	4,930,000	C.
Union	Colorado	1,250,000	1,250,000	1	01	June 1896	73,000	S.
United Verde	Arizona	300,000	3,000,000	10	25	December 1893	562,500	C.
Utah	Utah	100,000	1,000,000	20	02	Feb. 1897	175,000	G, S.
Utah Consolidated	Utah	80,000	150,000	5	02	Sept. 1896	3,000	S, L.
Victor	Colorado	200,000	1,000,000	5	10	March 1897	765,000	G.
Western Mine Enterprise	Montana	500,000	500,000	1	10	Mar 1897	12,000	
War Eagle	British Col.	500,000	500,000	1	06	October 1896	187,000	

S, Silver. G, Gold. L, Lead. C, Copper. Q, Quicksilver. I, Iron. B, Borax.

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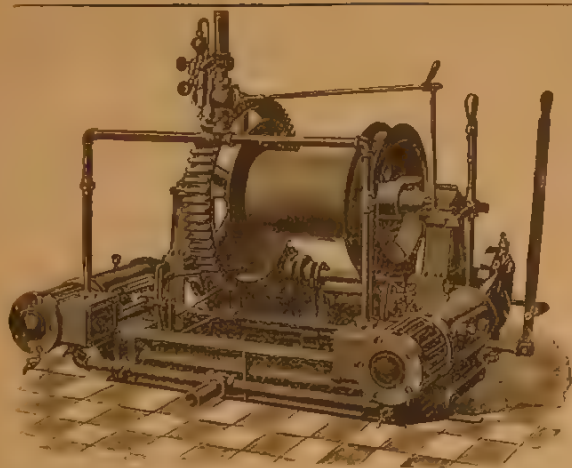
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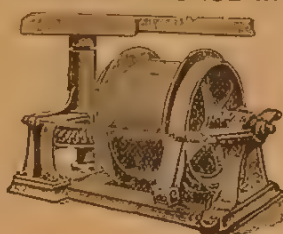
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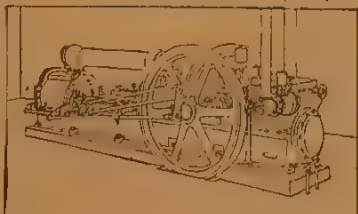
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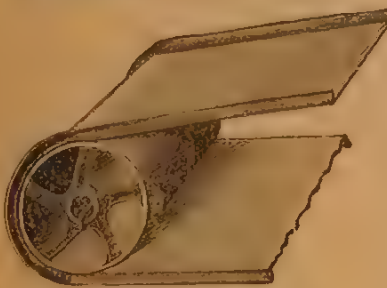
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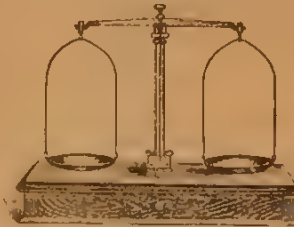
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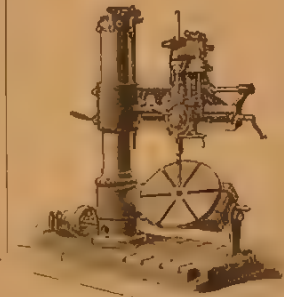
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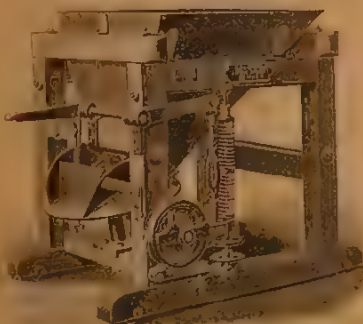
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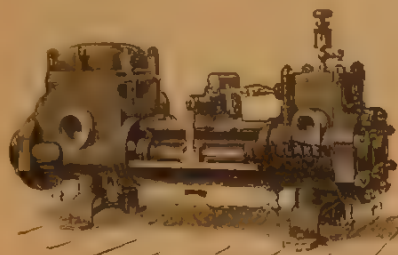
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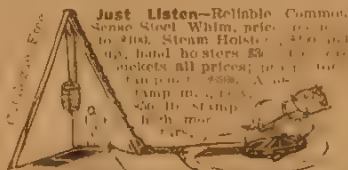
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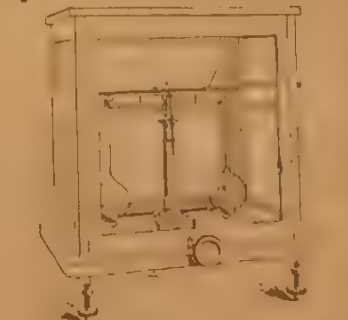
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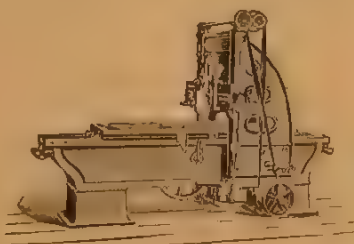
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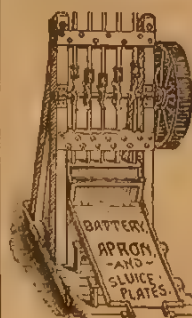
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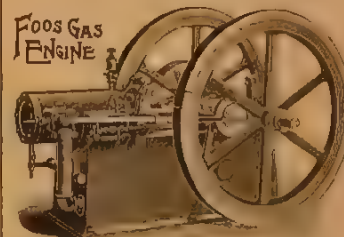
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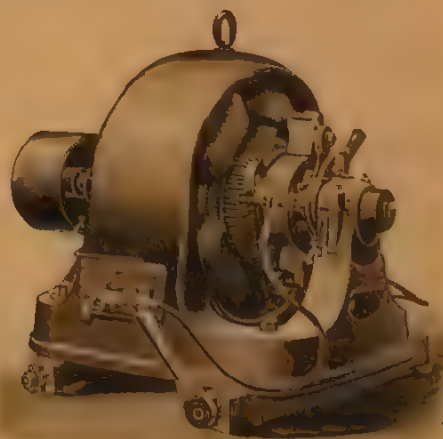
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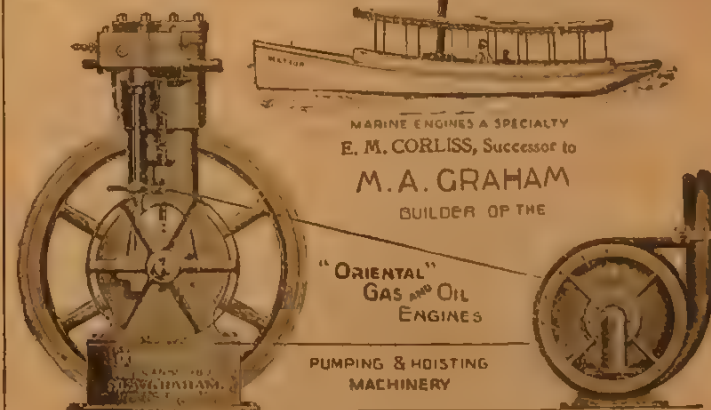
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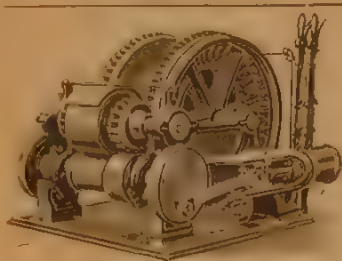
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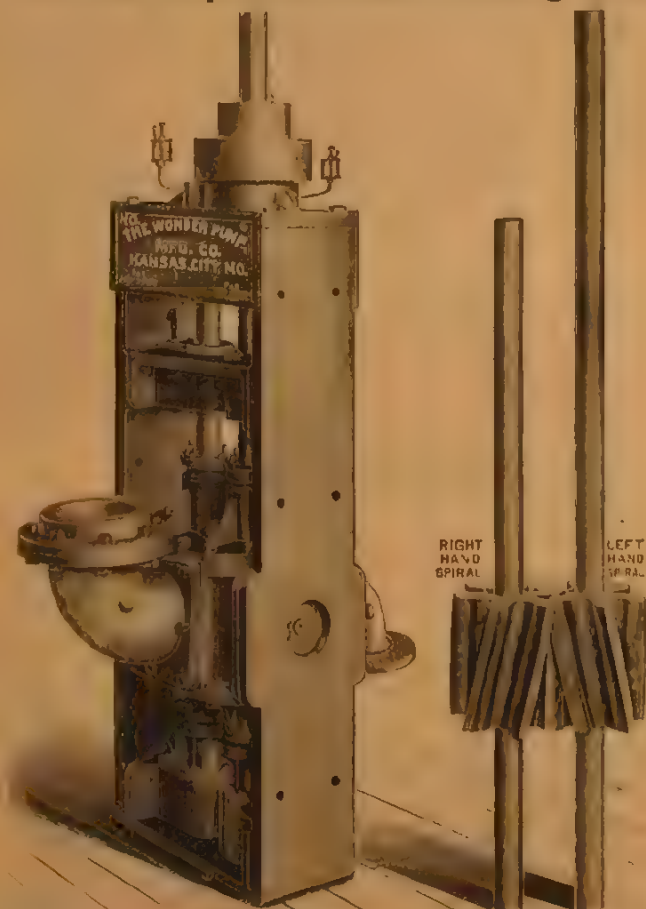
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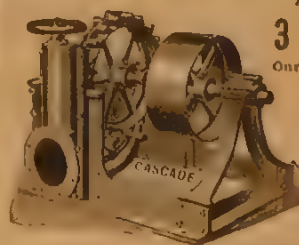
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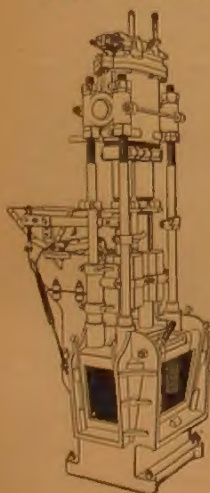
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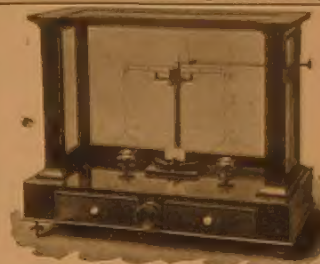
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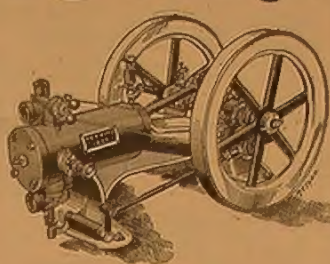
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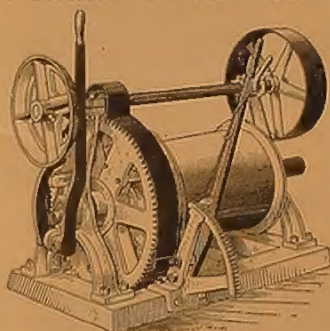
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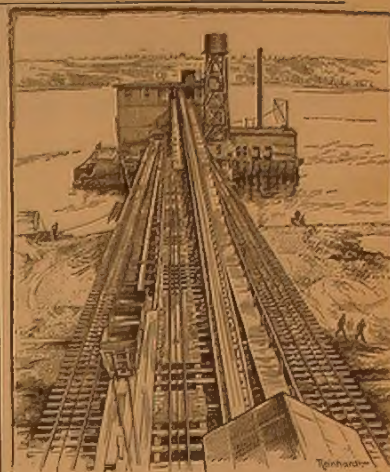
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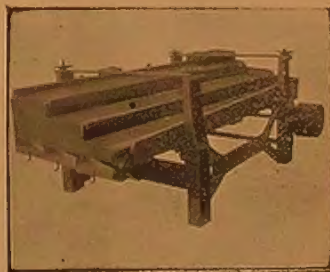
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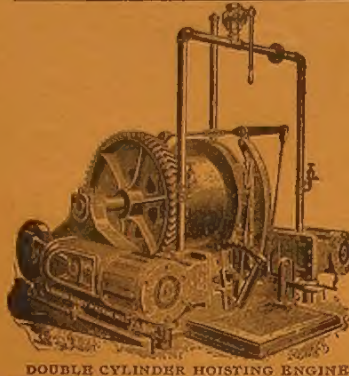
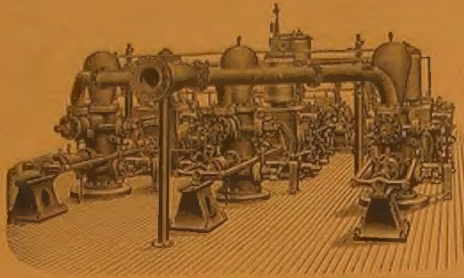
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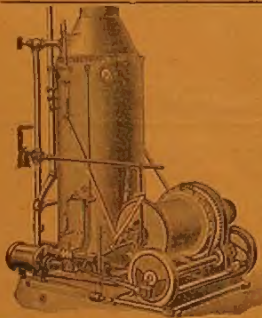
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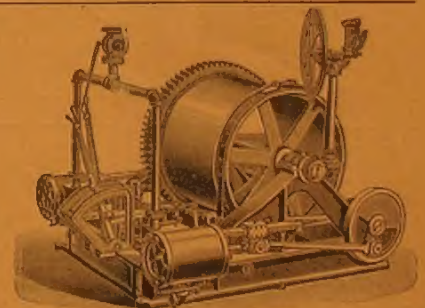
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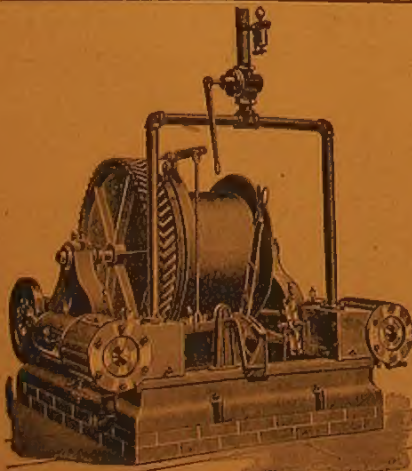
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